The Role of Economic Analysis

Economic analysis of ground water protection programs is concerned with the identification and measurement of the benefits and costs of protecting the quality of ground water resources. Knowledge of benefits and costs can assist in the formulation of ground water protection programs in at least three ways: (1) it provides a test of the economic feasibility of programs or program elements, (2) it provides criteria for improving the cost-effectiveness of program elements, and (3) it assists in identifying optimal protection programs. Economic analysis has rarely if ever been rigorously used in current efforts to protect ground water. However, such analysis would assure greater benefit from public investments that have been based largely on intuitive reasoning and philosophical commitment.

A ground water resource (such as an aquifer or a portion of an aquifer) is a natural resource with a finite economic value. Its value includes the capitalized net worth of all the services that the resource can be expected to provide over time (use value, such as water for human consumption, water for community uses, water for industrial uses, and dry weather streamflow). The value of each resource service, in turn, is derived from the economic activities that make use of that service (residential uses, commercial activities, industrial production, and recreational uses of streams, for example). In some circumstances, the value of a natural resource may also include intrinsic values, such as option, existence, or bequest values.

Ground water contamination alters the characteristics of the service flows so that they are less valuable now or in the future (e.g., available water is no longer suitable for some uses, such as human consumption, or is suitable only after previously unnecessary treatment). Their capitalized value, the value of the ground water resource, is thereby reduced. Society may also place a value on the continued existence of uncontami-nated ground water resources, regardless of any plans for use of services, during the immediate future (existence value) or extended through future generations (bequest value). Where the potentially contaminated resource is without close substitutes, and the prospective changes are effectively irreversible, even individuals who are not certain to use the resource in the future may attach value to preservation of the opportunity of use (option value). The intended benefits of a ground water protection program are the increased value of the ground water resource, considering both use value and intrinsic value, compared with the total value that would have resulted in the absence of the program. In some cases, benefits may be limited to the cost of restoring a contaminated aquifer in the future (including the value of uses temporarily lost) or by the cost of providing an alternative supply.

Measurement difficulties are frequently encountered in the evaluation of